OBF - 2020 - F2 N1

Q01. a) $V_y = V \cdot sen60° = 28\frac{cm}{s} \cdot \frac{\sqrt{3}}{2} \cong 23,4\frac{cm}{s}$

$DP_y \cong 23,4\frac{cm}{s} \cdot 4s = 93,6cm$ //

~~Logo Como~~ ~~x~~

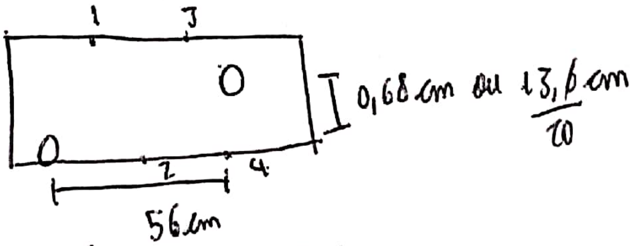
$n° co = 93,6\cancel{cm} \cdot \frac{1co}{20\cancel{cm}} = 4 + \frac{13,6}{20} \to$ 4 colisões //

b) $V_x = V cos60° = 28\frac{cm}{s} \cdot \frac{1}{2} = 14\frac{cm}{s}$

$DP_x = 14\frac{cm}{s} \cdot 4s = 56cm$

$DP_x + DP_y = DP_T \Rightarrow DP_T \cong 56cm + 93,6cm = 149,6cm$ //

c) $\cancel{Ds = \Delta S^2 = DP_x^2 +}$



$\Delta S^2 = 56^2 + \left(\frac{68}{100}\right)^2 \cong 56,009 cm$ //

Q 02 $V = \frac{2\pi r}{T} \Rightarrow T = \frac{2\pi r}{V} \Rightarrow T^2 = \frac{4\pi^2 \cdot r^2}{V^2}$

$\cancel{\frac{R_B^3}{R_A^3}}$ $\frac{R_B^3}{T_B^2} = \frac{R_A^3}{T_A^2} \Rightarrow \frac{R_B^3}{R_A^3} = \frac{T_B^2}{T_A^2} \Rightarrow \frac{R_B^3}{R_A^3} = \frac{\frac{4\pi^2 R_B^2}{V_B^2}}{\frac{4\pi^2 \cdot R_A^2}{V_A^2}} \Rightarrow \frac{R_B}{R_A} = \frac{V_A^2}{V_B^2}$ //

• $\frac{E_{cB}}{E_{cA}} = \frac{\frac{m_x \cdot V_B^2}{2}}{\frac{m_x \cdot V_A^2}{2}} \Rightarrow \frac{V_B^2}{V_A^2} = \frac{R_A}{R_B} = \frac{R_A}{\frac{3R_A}{2}} = \frac{2}{3}$ //

03 (I) $t_x = t_s - t_l$

$t_s = 52Q \cdot \frac{1s}{30Q} = \frac{26}{15}s$

$v_l \cdot t_l = s$

$v_s \cdot t_s = s$ $\Rightarrow$ $v_l \cdot t_l = v_s \cdot t_s \Rightarrow t_l = \frac{v_s \cdot t_s}{v_l}$ (II)

$\cancel{\frac{v_s}{t_l}} = v_l \cancel{v_s}$

Sendo $v_s = 340 \frac{m}{s}$ e $v_l \cong 3 \cdot 10^8 \frac{m}{s}$;

Aplicando (II) em (I)

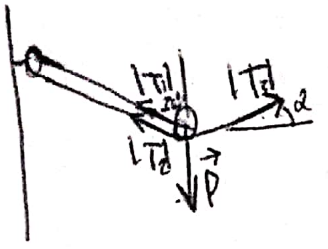
$\cancel{t_x = -\frac{v_s \cdot t_s}{v_l} + t_s} \Rightarrow \cancel{t_x = t_s\left(-\frac{v_s}{v_l} + 1\right)} \Rightarrow \cancel{t_s\left(-\frac{3 \cdot 10^8 \frac{m}{s}}{340 \frac{m}{s}} + \frac{340 \frac{m}{s}}{340 \frac{m}{s}}\right) = \frac{26}{15}s}$

$t_s \left(1 - \frac{340}{3 \cdot 10^8}\right) = \frac{26}{15} \Rightarrow \cancel{t_s}\ t_s = \frac{26}{15} \cdot \frac{3 \cdot 10^8}{3 \cdot 10^8 - 340} \cong \frac{26}{15} \cdot \frac{3 \cdot 10^8}{3 \cdot 10^8} \Rightarrow$

$\cancel{t_s \cong 1{,}73s}$ $t_s \cong 1{,}75s \Rightarrow 340 \frac{m}{s} \cdot 1{,}75s = 595m$ //

$\cancel{v_s}$ $340 \frac{m}{s} \cdot \cancel{1{,}75s \cong}$ $595m \cong d$ //

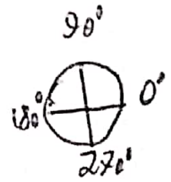
Q4 $\cdot\ |\vec{T_1}| = |\vec{T_2}| = |\vec{T_3}| = T$



a) $2T \operatorname{sen} 30° = T \cdot \cos\alpha$

$2 \cdot \frac{1}{2} = \cos\alpha$

$1 = \cos\alpha \rightarrow \alpha = 0°$



b) $2T\cos 30° + T \cdot \operatorname{sen} 0° = |P|$ $(\operatorname{sen} 0° = 0)$

$2T \cdot \frac{\sqrt{3}}{2} = 600N$

$T \cong 340N$

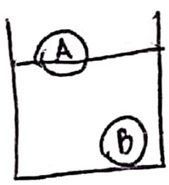
Q5 a) $T_R = 42 \cdot 10^3 \frac{\cancel{J}}{\cancel{h}} \cdot \frac{1 \cancel{cal}}{4{,}2 \cancel{J}} \cdot \frac{1 \cancel{hora}}{3 \cancel{kg}} \cdot \frac{1 \cancel{kg}}{1 \cancel{kg}} \cdot \frac{1 \cancel{kg}}{10^3 \cancel{g}} \cdot \frac{1 \cancel{g} \cdot 1°C}{1 \cancel{cal}} \cdot \frac{60 \cancel{h}}{1 \cancel{hora}} = 20°C$

$T_T = 20°C + 15°C = 35°C$

b) $T_R = 4{,}2 \cdot 10^7 \frac{\cancel{J}}{\cancel{h}} \cdot \frac{1 \cancel{cal}}{4{,}2 \cancel{J}} \cdot \frac{1 \cancel{hora}}{6{,}6 \cancel{ton}} \cdot \frac{60 \cancel{h}}{1 \cancel{hora}} \cdot \frac{1 \cancel{ton}}{1 \cancel{kg}} \cdot \frac{1 \cancel{kg}}{10^3 \cancel{g}} \cdot \frac{1 \cancel{g} \cdot 1°C}{1 \cancel{cal}} \cong 9{,}09°C$

$T_T \cong 9{,}09°C + 24°C = 33{,}09°C$ //

Q6



$\vec{F}_{RA} = \emptyset \rightarrow E_A = P_A$

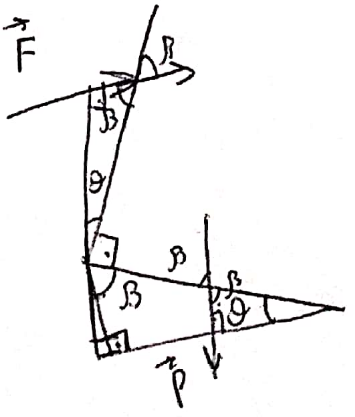
$\frac{105}{100} u \cdot g \cdot vol_i = vol_T \cdot g \cdot \frac{95}{100} u$

$vol_i = \frac{95}{105} vol_T$

$vol_i + vol_E = vol_T \Rightarrow vol_E = \frac{105 vol_T}{105} - \frac{95 vol_T}{105}$

$vol_E = \frac{10 vol_T}{105} \Rightarrow \frac{vol_E}{vol_T} = \frac{10}{105}$ ou $\frac{2}{21}$ ou $\cong 0{,}095$

Q.12. b) $\vec{F}$



~~Tudo se passa em uma~~

Enquanto a prateleira inclina o braço de alavanca de $\vec{F}$ aumenta e $\vec{P}$ diminui, logo; se inicialmente o torque de $\vec{F}$ for maior a prateleira tombará.

$F \cdot X = P \cdot 20cm$

$100N \cdot X = 250N \cdot 20cm$

$X = 50cm$

Logo $h_{mín} = 90cm - 50cm = 40cm$

$h_{máx} = 90cm + 50cm = 140cm$ //

a- $F = m \cdot a \Rightarrow 100N = 25kg \cdot \vec{a} \Rightarrow a = 4\frac{m}{s^2}$ //

c)

$$\bar{F_m} = \frac{9\,500\,N}{100\,cm} \cdot \frac{25\,cm}{10}$$

$$\bar{F_m} \cdot d = E_c$$

$$\bar{F_m} \cdot d = \frac{m \cdot V_x^2}{2}$$

$$\sqrt{\frac{2F_m \cdot d}{m}} = V_x$$

$$V_x \cdot m_x = V_0 \cdot m_0$$

$$5\,Kg \cdot V_x = 10g \cdot \frac{1Kg}{10^3 g} \cdot V_0$$

$$500 V_x = V_0$$

$$\cancel{500}\sqrt{2}$$

$$500\sqrt{\frac{2 \cdot 9500}{100 \cdot 5} \cdot \frac{25}{10} \cdot \frac{25}{10}} = V_0$$

$$V_0 \cong 53000 \frac{m}{s} \,//$$